

CLAIMS

What is claimed is:

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1. A drill bit comprising: a bit body; at least one roller cone attached to the bit body and able to rotate with respect to the bit body; and a plurality of cutting elements disposed on the at least one roller cone, at least one bit design parameter selected so that the cutting elements wear in a selected manner when drilling an earth formation.

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2. The drill bit of claim 1, wherein the at least one bit design parameter is selected to optimize a rate of penetration over the life of the drill bit.

3. The drill bit of claim 1, wherein the at least one bit design parameter is selected to maximize a total life of the drill bit.

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4. The drill bit of claim 1, wherein the at least one bit design parameter is selected to optimize a rate of penetration and maximize a total life of the drill bit.

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5. The drill bit of claim 1, wherein the at least one bit design parameter is selected to substantially optimize a distribution of axial forces over the drill bit over the life of the drill bit.

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6. The drill bit of claim 1, wherein the drill bit comprises a plurality of roller cones having cutting elements thereon, the at least one bit design parameter selected to substantially balance axial forces between roller cones over the life of the drill bit.

7. The drill bit of claim 1, wherein the at least one bit design parameter is selected to substantially optimize work performed over the drill bit over the life of the drill bit.

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8. The drill bit of claim 1, wherein the drill bit comprises a plurality of roller cones having cutting elements thereon, the at least one bit design parameter selected to substantially balance work performed between roller cones over the life of the drill bit.

5 9. The drill bit of claim 1, wherein the at least one bit design parameter is selected to substantially optimize a volume of formation cut by cutting elements over the drill bit over the life of the drill bit.

10 10. The drill bit of claim 1, wherein the drill bit comprises a plurality of roller cones having cutting elements thereon, the at least one bit design parameter selected to substantially balance a volume of formation cut by cutting elements between roller cones over the life of the drill bit.

11. The drill bit of claim 1, wherein the at least one bit design parameter is selected to increase durability of the drill bit.

12. The drill bit of claim 11, wherein the at least one bit design parameter comprises cutting element material.

20 13. The drill bit of claim 12, wherein the cutting element material comprises tungsten carbide.

14. The drill bit of claim 12, wherein the cutting elements are formed from at least two different materials.

25 15. The drill bit of claim 14, wherein at least one of the at least two different materials comprises a hardfacing material.

16. The drill bit of claim 11, wherein the at least one bit design parameter comprises a number of cutting elements.

17. The drill bit of claim 11, wherein the at least one bit design parameter comprises a hardness of a cutting element material.

18. The drill bit of claim 11, wherein the at least one bit design parameter
5 comprises cutting element geometry.

19. The drill bit of claim 1, wherein the at least one bit design parameter is selected to minimize wear of the cutting elements.

10 20. The drill bit of claim 19, wherein the at least one bit design parameter comprises cutting element material.

15 21. The drill bit of claim 20, wherein the cutting element material comprises tungsten carbide.

22. The drill bit of claim 20, wherein the cutting elements are formed from at least two different materials.

20 23. The drill bit of claim 22, wherein at least one of the at least two different materials comprises a hardfacing material.

25 24. The drill bit of claim 19, wherein the at least one bit design parameter comprises a number of cutting elements.

25 25. The drill bit of claim 19, wherein the at least one bit design parameter comprises a hardness of a cutting element material.

30 26. The drill bit of claim 19, wherein the at least one bit design parameter comprises cutting element geometry.

27. The drill bit of claim 1, wherein the at least one bit design parameter comprises cutting element material.

28. The drill bit of claim 27, wherein the cutting element material comprises tungsten carbide.

29. The drill bit of claim 27, wherein the cutting elements are formed from at least 5 two different materials.

30. The drill bit of claim 29, wherein at least one of the at least two different materials comprises a hardfacing material.

10 31. The drill bit of claim 1, wherein the at least one bit design parameter comprises a number of cutting elements.

32. The drill bit of claim 31, wherein the at least one bit design parameter comprises a hardness of a cutting element material.

15 33. The drill bit of claim 31, wherein the at least one bit design parameter comprises cutting element geometry.

20 34. The drill bit of claim 1, wherein the at least one bit design parameter comprises a number of cutting elements on each roller cone.

35. The drill bit of claim 1, wherein the cutting element material comprises tungsten carbide.

25 36. The drill bit of claim 1, wherein the at least one bit design parameter comprises cutting element geometry.